CLAIMS

What is claimed is:

1.   A method for selecting a number of speakers for an audio system, the method comprising:

5   generating acoustic signals from at least one loudspeaker placed at potential loudspeaker locations;

recording transfer functions at a plurality of listening positions for the generated acoustic signals;

determining at least one potential number of speakers;

10   modifying the transfer functions based on the potential number of speakers in order to generate predicted transfer functions;

statistically analyzing across at least one frequency of the predicted transfer functions for the plurality of listening positions; and

selecting at least one loudspeaker location based on the statistical analysis.

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2.   The method of claim 1, where determining at least one potential number of speakers comprises selecting a minimum and a maximum potential number of speakers.

3.   The method of claim 1, where the potential numbers of speakers is selected to be less

20   than or equal to an integer.

4.   The method of claim 1, where modifying the transfer functions comprises:

determining potential combinations of speakers at potential speaker locations, the potential combinations being equal to at least one of the potential number of speakers; and

25   for each listening position, combining the transfer functions for each of the potential combinations to generate predicted transfer functions.

5.   The method of claim 1, where statistically analyzing the predicted transfer functions comprises analyzing frequencies of the predicted transfer functions below about 120 Hz.

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6.   The method of claim 1, where the statistical analysis indicates consistency of the

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predicted transfer functions across the plurality of listening positions.

7.   The method of claim 6, where a number of speakers for a specific predicted transfer function is selected when the specific predicted transfer function is more consistent than other predicted transfer functions.

8.   The method of claim 1, where the statistical analysis is selected from the group consisting of mean spatial variance, mean spatial standard deviation, mean spatial envelope, and mean spatial maximum average

9.   The method of claim 1, where the statistical analysis indicates flatness for the predicted transfer functions.

10.   The method of claim 9, where a number of speakers for a specific predicted transfer function is selected when the specific predicted transfer function is flatter than other predicted transfer functions.

11.   The method of claim 1, where the statistical analysis is selected from the group consisting of variance of spatial average, standard deviation of the spatial average, envelope of the spatial average, and variance of the spatial minimum.

12.   The method of claim 1, where the statistical analysis indicates differences in overall sound pressure level among the plurality of listening positions for the predicted transfer functions.

13.   The method of claim 12, where a number of speakers for a specific predicted transfer function is selected when the specific predicted transfer function has fewer differences in overall sound pressure level among the plurality of listening positions than other predicted transfer functions.

14.   The method of claim 1, where the statistical analysis is selected from the group consisting of variance of mean levels, standard deviation of mean levels, envelope of mean

levels, and maximum average of mean levels.

15. The method of claim 1, where the statistical analysis indicates efficiency of the predicted transfer functions at the plurality of listening positions.

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16. A method for selecting a number of speakers for an audio system, the method comprising:

recording transfer functions at at least one listening position;

determining at least one potential number of speakers;

10 modifying the transfer functions based on the potential number of speakers in order to generate predicted transfer functions;

statistically analyzing the predicted transfer functions; and

selecting the number of speakers from the potential number of speakers based on the statistical analysis.

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17. The method of claim 16, where recording transfer functions comprises:

generating acoustic signals from the speaker placed at each potential speaker position; and

recording the transfer functions at the listening position for the generated acoustic 20 signals.

18. The method of claim 16, where determining at least one potential number of speakers comprises selecting a minimum and a maximum potential number of speakers.

25 19. The method of claim 16, where the potential numbers of speakers is selected to be less than or equal to an integer.

20. The method of claim 16, where modifying the transfer functions comprises:

determining potential combinations of speakers at potential speaker locations, the 30 potential combinations being equal to at least one of the potential number of speakers; and

combining the transfer functions for each of the potential combinations to generate predicted transfer functions for each of the potential combinations.

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21.   The method of claim 16, where statistically analyzing the predicted transfer functions comprises analyzing frequencies of the predicted transfer functions below about 120 Hz.

5   22.   The method of claim 16, where recording transfer functions comprises recording at a plurality of listening positions; and

where statistically analyzing the predicted transfer functions comprises analyzing the predicted transfer functions across the plurality of listening positions.

10   23.   The method of claim 22, where analyzing the predicted transfer functions across the plurality of listening positions is as a function of frequency.

24.   The method of claim 16, where recording transfer functions comprises recording at a plurality of listening positions; and

15   where statistically analyzing the predicted transfer functions comprises analyzing the predicted transfer functions for each of the plurality of listening positions.

25.   The method of claim 16, where recording transfer functions comprises recording at a plurality of listening positions; and

20   where the statistical analysis indicates consistency of the predicted transfer functions across the plurality of listening positions.

26.   The method of claim 25, where a number of speakers for a specific predicted transfer function is selected when the specific predicted transfer function is more consistent than other

25   predicted transfer functions.

27.   The method of claim 16, where the statistical analysis is selected from the group consisting of mean spatial variance, mean spatial standard deviation, mean spatial envelope, and mean spatial maximum average

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28.   The method of claim 16, where the statistical analysis indicates flatness for the predicted transfer functions.

29.   The method of claim 28, where a number of speakers for a specific predicted transfer function is selected when the specific predicted transfer function is flatter than other predicted transfer functions.

30.   The method of claim 16, where the statistical analysis is selected from the group consisting of variance of spatial average, standard deviation of the spatial average, envelope of the spatial average, and variance of the spatial minimum.

31.   The method of claim 16, where the statistical analysis is selected from the group consisting of amplitude variance and amplitude standard deviation.

32.   The method of claim 16, where recording transfer functions comprises recording at a plurality of listening positions; and
        where the statistical analysis indicates differences in overall sound pressure level among the plurality of listening positions for the predicted transfer functions.

33.   The method of claim 32, where a number of speakers for a specific predicted transfer function is selected when the specific predicted transfer function has fewer differences in overall sound pressure level among the plurality of listening positions than other predicted transfer functions.

34.   The method of claim 16, where the statistical analysis is selected from the group consisting of variance of mean levels, standard deviation of mean levels, envelope of mean levels, and maximum average of mean levels.

35.   The method of claim 16, where the statistical analysis indicates efficiency of the predicted transfer functions.

36.   The method of claim 35, where efficiency is examined for predetermined frequencies.

37.   The method of claim 36, where a number of speakers for a specific transfer function is selected when the specific transfer function has greater efficiency than other predicted transfer functions.

5   38.   The method of claim 16, where the statistical analysis comprises acoustic efficiency.

39.   The method of claim 38, where the acoustic efficiency comprises a mean overall level divided by a total drive level for the predicted transfer function.

10   40.   The method of claim 38, where the acoustic efficiency comprises a mean level divided by a total drive level for the predicted transfer function.

41.   The method of claim 38, where a number of speakers for a specific transfer function is selected when the specific transfer function has greater acoustic efficiency of the audio 15   system than other predicted transfer functions.

42.   The method of claim 16, where the statistical analysis indicates output of predicted transfer functions.

20   43.   The method of claim 42, where output is examined for predetermined frequencies.

44.   The method of claim 43, where the predetermined frequencies are below 50 Hz.

45.   The method of claim 44, where a number of speakers for a specific transfer function is 25   selected when the specific transfer function has greater output of the audio system in the predetermined frequencies than other predicted transfer functions.

46.   The method of claim 16, where the statistical analysis comprises mean overall level.

30   47.   The method of claim 16, where the statistical analysis comprises mean level.

48.   A machine readable medium having software for causing a computer to execute a

method, the machine readable medium comprising:

     instructions for recording at least one potential number of speakers;

     instructions for recording transfer functions at at least one listening position;

     instructions for modifying the transfer functions based on the potential number of

5   speakers in order to generate predicted transfer functions; and

     instructions for statistically analyzing the predicted transfer functions.

49.   The machine readable medium of claim 48, where the instructions for recording transfer functions comprise instructions for recording at a plurality of listening positions; and

10   where the instructions for statistically analyzing the predicted transfer functions comprise instructions for analyzing the predicted transfer functions across the plurality of listening positions.

50.   The machine readable medium of claim 48, further comprising instructions for recommending a specific number of speakers.

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51.   A signal-bearing medium having instructions for causing a computer to execute a method, the signal-bearing medium comprising:

     logic for recording at least one potential number of speakers;

     logic for recording transfer functions at at least one listening position;

20   logic for modifying the transfer functions based on the potential number of speakers in order to generate predicted transfer functions; and

     logic for statistically analyzing the predicted transfer functions.

52.   The signal-bearing medium of claim 51, where the logic for recording transfer

25   functions comprises instructions for recording at a plurality of listening positions; and

     where the logic for statistically analyzing the predicted transfer functions comprises logic for analyzing the predicted transfer functions across the plurality of listening positions.

53.   The signal-bearing medium of claim 52, further comprising logic for recommending a specific number of speakers.

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54.   In an audio system comprising multiple speakers and at least one listening position, a method for selecting at least one type of speaker for the audio system comprising:

determining potential types of speakers;

recording transfer functions at the listening position with the potential types of speaker in a plurality of potential speaker locations;

modifying the transfer functions based on the potential types of speakers and based on the potential speaker locations in order to generate predicted transfer functions;

statistically analyzing the predicted transfer functions; and

selecting at least one type of speaker based on the statistical analysis.

55.   The method of claim 54, where recording transfer functions comprises:

generating acoustic signals from each type of speaker placed at each potential speaker position; and

recording the transfer functions at the listening position for the generated acoustic signals.

56.   The method of claim 54, where the potential types of speakers comprises speakers of at least one different quality.

57.   The method of claim 56, where the different quality comprises polarity.

58.   The method of claim 54, where modifying the transfer functions based on the potential values comprises:

determining potential combinations of potential types of speakers at potential speaker locations; and

combining the transfer functions for each of the potential combinations to generate predicted transfer functions for each of the potential combinations.

59.   The method of claim 54, where statistically analyzing the predicted transfer functions comprises analyzing the predicted transfer functions for the at least one listening position.

60.   The method of claim 54, where the audio system comprises a plurality of listening

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positions.

61.   The method of claim 60, where recording transfer functions comprises:

generating the acoustic signals from each type of speaker placed at each potential speaker position; and

recording the transfer functions at the plurality of listening positions for the generated acoustic signals.

62.   The method of claim 61, where modifying the transfer functions based on the potential values comprises:

determining potential combinations of potential types of speakers at potential speaker locations; and

combining the transfer functions for each listening position for each of the potential combinations to generate predicted transfer functions.

63.   The method of claim 54, where the statistical analysis indicates consistency of the predicted transfer functions across the plurality of listening positions.

64.   The method of claim 54, where the statistical analysis indicates flatness for the predicted transfer functions.

65.   The method of claim 54, where the statistical analysis indicates efficiency of the predicted transfer functions.

66.   A machine readable medium having software for causing a computer to execute a method, the machine readable medium comprising:

instructions for determining potential types of speakers;

instructions for recording transfer functions at a listening position in the audio system with the potential types of speaker in a plurality of potential speaker locations;

instructions for modifying the transfer functions based on the potential types of speakers and based on the potential speaker locations in order to generate predicted transfer functions;

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instructions for statistically analyzing the predicted transfer functions.

67.   The machine readable medium of claim 66, where the instructions for recording transfer functions comprise instructions for recording at a plurality of listening positions; and

5   where the instructions for statistically analyzing the predicted transfer functions comprise instructions for analyzing the predicted transfer functions across the plurality of listening positions.

68.   The machine readable medium of claim 66, further comprising instructions for recommending at least one type of speaker.

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